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AUTHOR Smith, Douglas K.; And Others
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ABSTRACT

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WISC-III/K-BIT Relationships in Students with Learning Disabilities

Douglas K. Smith

Sharon Buckley

Marj Pingatore

School Psychology Program

University of Wisconsin-River Falls

River Falls, WI 54022

Paper presented at annual meeting of American Psychological Association, Washington, DC, August 1992.

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Abstract

The Wechsler Intelligence Scale for Children-III and the Kaufman Brief Intelligence Test were administered in counterbalanced order to a sample of 39 school identified students (28 males and 11 females) with learning disabilities. Mean age was 9 years, 3 months. The WISC-III Full Scale IQ and K-BIT IQ Composite produced a correlation of .74 ($p < .001$). Similarly, K-BIT subtests of Vocabulary and Matrices correlated significantly ($p < .001$) with the Verbal IQ and Performance IQ (.65 and .63, respectively). T-tests for related samples indicated no significant differences for the WISC-III Full Scale IQ and K-BIT IQ Composite comparison.

During the past year, the Wechsler Intelligence Scale for Children-III (WISC-III; Wechsler, 1991), a revision of the Wechsler Intelligence Scale for Children-Revised (WISC-R) and the Kaufman Brief Intelligence Test (K-BIT; Kaufman & Kaufman, 1990) have been introduced to the testing community. Both instruments are individually administered tests of intelligence with the WISC-III providing a comprehensive measure of ability and the K-BIT providing a quick measure of intelligence requiring less than 30 minutes. Although the purposes of the two tests differ, it is likely that they will both be used in school settings as part of the initial evaluation process for students referred for learning problems or the re-evaluation process for students already placed in special education programs. Therefore, it is important to determine their relationship to each other using both clinical and non-clinical samples.

The WISC-III covers the age range of 6 years, 0 months to 16 years, 11 months. Test items are divided into Verbal and Performance categories. The Verbal Scale subtests include: Information, Similarities, Arithmetic, Vocabulary, Comprehension, and Digit Span (optional). The Performance Scale subtests include: Picture Completion, Coding, Picture Arrangement, Block

Design, Object Assembly, Symbol Search (optional), and Mazes (optional). Standard scores (mean of 100, standard deviation of 15) are obtained for the Verbal Scale (VSIQ), Performance Scale (PSIQ) and Full Scale (FSIQ) along with four factor-based Index Scores: Verbal Comprehension (VC), Perceptual Organization (PO), Freedom from Distractibility (FD), and Processing Speed (PS). The standardization sample consisted of 2,200 children and was designed to match the 1988 U.S. census estimates on the basis of age, gender, race/ethnicity, geographical region, and parent educational level. Split half reliability estimates for subtests with the Spearman-Brown correction ranged from .60 to .92 and from .89 to .97 for the global scales. Test-retest reliability for a sample of 353 children tested at a mean interval of 23 days ranged from .64 to .94. Several validity studies relating performance on the WISC-III with other ability tests are described in the test manual.

The K-BIT spans the age range of 4 to 90 years and consists of two subtests, Vocabulary and Matrices. Vocabulary requires verbal responses to (a) expressive vocabulary items in which the individual provides the name for a pictured object and (b) definitions (administered to individuals ages 8 years and older) in

which the individual provides the word that best fits two clues (a descriptive phrase and partial spelling of the word). Matrices consists of 48 multiple choice items that require an understanding of relationships among the visually presented stimuli (both meaningful and abstract). Age based standard scores (mean of 100, standard deviation of 15) are provided for each subtest and the overall K-BIT IQ Composite (COMP). Test items are grouped in units. Starting points are based on the individual's chronological age and the discontinue rule is failure on every item in one unit. The standardization sample consisted of 2,022 individuals with approximately equal numbers of males and females at each age level. The sample was designed to match 1990 U. S. census estimates and stratified on the basis of geographic region, socioeconomic status and race or ethnic group. Split-half reliability estimates corrected by the Spearman-Brown formula ranged from .88 to .98 by age level for the COMP. Test-retest reliability coefficients for 232 individuals ages 5 to 89 tested at a mean interval of 21 days ranged from .92 (ages 5-12) to .95 (ages 20-54 and 55-89) for the COMP. Twenty validity studies comparing the K-BIT with other measures of ability and achievement are reported in the test manual. Correlation coefficients between the COMP

and the K-ABC Mental Processing Composite ranged from .58 to .69. Correlation coefficients between the COMP and the WISC-R FSIQ and Wechsler Adult Intelligence Scale-Revised FSIQ were .80 and .75, respectively.

Purpose of the Study

Since the WISC-III and K-BIT have been in use for a short period of time, studies comparing the two tests are not available. One study, in which the K-BIT and WISC-R were compared in a nonhandicapped sample is reported in the K-BIT manual. A correlation of .80 was obtained between the K-BIT IQ Composite and the WISC-R FSIQ score. Therefore, the purpose of the present study was to compare the performance of school-identified students with learning disabilities on the WISC-III and K-BIT.

Method

Subjects

The subjects for this study consisted of 39 students (28 males and 11 females) identified as having learning disabilities and enrolled in a middle-class, predominantly white, suburban school system in the midwest. The 39 students represented all students referred for learning disabilities services during Fall Quarter of 1991. Each student was identified as having a learning disability using criteria including a

significant discrepancy between cognitive ability and academic achievement as well as teacher reports. The subjects ranged in age from 6 years, 7 months to 12 years, 11 months with a mean age of 9 years, 3 months.

Procedure

The WISC-III and K-BIT were administered in counterbalanced order by advanced-level graduate students with Master's degrees in school psychology and trained in the administration and interpretation of intelligence tests. Twenty students were administered the WISC-III followed by the K-BIT while nineteen students completed the K-BIT followed by the WISC-III. Testing for each student took place the same day with a one hour break between tests.

Results

Mean scores ranged from 90.94 (FD) to 109.19 (PO) on the WISC-III and from 101.97 (Vocabulary) to 103.36 (COMP) on the K-BIT. Considerable variability, however, was demonstrated by the 39 students in the sample. For example, WISC-III FSIQ scores ranged from 70 to 135 and K-BIT IQ Composites ranged from 74 to 136. The means, standard deviations and ranges for the global scales of each test are presented in Table 1.

Insert Table 1 about here

Pearson product moment correlations were calculated for both tests with each other. The FSIQ and COMP produced a correlation of .74 ($p < .001$) which suggests a strong relationship between the two measures. In addition, the FSIQ correlated significantly ($p < .001$) with the Vocabulary and Matrices subtests of the K-BIT. The VIQ/Vocabulary and VC/Vocabulary correlations were .64 ($p < .001$) and .65 ($p < .001$), respectively, indicating that both the Verbal IQ score and the VC Index Score are strongly related to the K-BIT Vocabulary subtest. The PIQ/Matrices and PO/Matrices correlations were .63 ($p < .001$) and .61 ($p < .001$), respectively, suggesting a strong relationship between both the Performance Scale and the PO Index Score of the WISC-III and the K-BIT Matrices subtest. Correlations of the FD Index Score with the K-BIT Vocabulary and Matrices subtests were not significant at .26 and .29, respectively. The PS Index Score produced a correlation of .54 ($p < .04$) with the K-BIT Matrices subtest for the 11 students with scores on both measures. The complete table of correlations is presented in Table 2.

Insert Table 2 about here

Pearson product moment correlations were also calculated for subtests on the two instruments that purportedly measure similar constructs. These included the K-BIT Vocabulary subtest with the WISC-III subtests of Information, Vocabulary and Comprehension, and the K-BIT Matrices subtest with the WISC-III subtests of Picture Completion, Block Design and Object Assembly. Significant correlations ($p < .001$) were obtained for the K-BIT Vocabulary subtest with Information ($r = .56$), Vocabulary ($r = .59$) and Comprehension ($r = .59$) and for the K-BIT Matrices subtest with Picture Completion ($r = .63$), Block Design ($r = .57$) and Object Assembly ($r = .59$). At the same time the Matrices subtest produced significant correlations with two Verbal subtests, Information ($r = .70$) and Vocabulary ($r = .59$). The complete table of correlations is presented in Table 3.

Insert Table 3 about here

Differences in mean standard scores were analyzed by t-tests for related samples. Nonsignificant results were obtained for the FSIQ/COMP comparison ($t = 1.38$, p

> .05); the VIQ/K-BIT Vocabulary subtest comparison (t = .11, p > .05); and the VC Index/K-BIT Vocabulary subtest comparison (t = .93, p > .05). Significant differences were obtained for the PIQ/K-BIT Matrices subtest comparison (t = 2.06, p < .05); the PO Index/K-BIT Matrices subtest comparison (t = 3.86, p < .001); and the FD Index/K-BIT Matrices subtest comparison (t = 3.75, p < .001). Both the PIQ and PO Index Score were significantly higher than the Matrices score, while the FD Index Score was significantly lower than the Matrices score.

Discussion

In this sample of students with learning disabilities both the WISC-III and K-BIT related strongly to each other with an overall correlation of .74 and no significant difference between the mean FSIQ and the mean K-BIT IQ Composite, suggesting the scores are equivalent. In addition, strong relationships were indicated between the VIQ and VC Index Score and the K-BIT Vocabulary subtest. Similarly, the K-BIT Matrices subtest was strongly related to the WISC-III PIQ and PO Index score. However, the mean Matrices subtest score was four points lower than the mean PIQ and six points lower than the mean PO Index Score. At the subtest level, the vocabulary subtests of both tests were

strongly related to each other. In addition, the K-BIT Vocabulary subtest showed strong relationships to the Information and Comprehension subtests. The pattern of correlations suggests that the K-BIT Vocabulary subtest incorporates skills that are common to several WISC-III verbal subtests. The K-BIT Matrices subtest related strongly to three Performance Scale subtests (Picture Completion, Block Design, and Object Assembly) as well as to two Verbal Scale subtests (Information and Vocabulary). Overall, the K-BIT Vocabulary subtest correlated a significant level ($p < .05$) with five of the six WISC-III Verbal subtests and one Performance subtest, while the K-BIT Matrices subtest correlated at a significant level ($p < .05$) with three of the five Performance subtests and five of the six Verbal subtests. These results suggest that the Matrices subtest may involve some verbal components. Clearly, this needs to be explored in future studies.

These results suggest that the Vocabulary score on the K-BIT and the VIQ and VC Index scores on the WISC-III are measuring very similar constructs with equivalent scores. In the nonverbal area, however, there are differences between the two tests. While Matrices is strongly related to both PIQ and PO the scores are not equivalent. This may be the result of

the hypothesized verbal components of the Matrices subtest. It may also indicate that the Performance subtests of the WISC-III are measuring somewhat different constructs than those measured by the K-BIT.

The magnitude of global scale correlations in this study approximated those reported in the K-BIT manual for the WISC-R and K-BIT with a nonhandicapped sample. Thus, the validity data to date suggest that the two tests are strongly related to each other and produce similar scores. Although the K-BIT does not provide an indepth, comprehensive measure of ability (and is not a substitute for such an evaluation), it appears to offer valid scores that are obtained in about 20 minutes. For screening purposes and for situations in which a comprehensive evaluation is not needed, the K-BIT is a promising alternative. Thus, the practitioner in need of a quick estimate of a student's cognitive ability may find the K-BIT to be a useful alternative.

Possible uses for the K-BIT in the evaluation of students referred for learning disabilities services include a screening role to provide a quick estimate of a student's ability. In re-evaluations it could be used to verify the student's level of cognitive functioning, allowing more time to be devoted to the assessment of specific academic/cognitive skills. For cases in which

conflicting scores on different ability tests arise, the K-BIT could be used to confirm the student's level of functioning.

As with any new test, additional studies are needed to verify the validity of both the K-BIT and the WISC-III. While the present study, using a sample of elementary-age students with learning disabilities, found strong relationships between the global scales of the two tests, the sample size and age range of subjects were limited. Consequently, the relationship between the WISC-III and K-BIT should be explored with additional samples of students at varying age ranges and exhibiting a variety of disabilities.

References

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Wechsler, D. (1991). Wechsler Intelligence Scale for Children-III. San Antonio, TX]: The Psychological Corporation.

Table 1.

Means, standard deviations and ranges for global scales on the WISC-III and K-BIT

	Mean	Standard Deviation	Range
WISC-III			
Full Scale IQ	104.74	14.02	70-135
Verbal IQ	102.18	13.95	74-137
Performance IQ	107.49	13.95	69-142
Verbal Comprehension	102.97	14.74	73-139
Perceptual Organization	109.19	13.43	69-142
Freedom from Distractibility	90.94	12.97	57-118
Processing Speed	105.73	9.46	88-117
K-BIT			
K-BIT IQ Composite	103.36	13.03	74-136
Vocabulary	101.97	12.35	79-126
Matrices	103.18	16.10	65-148

Table 2.

Intercorrelations among WISC-III and K-BIT scales

	K-BIT		
	Composite	Vocabulary	Matrices

Table 2.

Intercorrelations among WISC-III and K-BIT scales

	K-BIT		
	Composite	Vocabulary	Matrices
WISC-III			
Full Scale IQ	.74***	.53***	.68***
Verbal Scale IQ	.74***	.64***	.62***
Performance Scale IQ	.62***	.37**	.63***
Verbal Comprehension	.75***	.65***	.57***
Perceptual Organization	.28*	-.38*	.61***
Freedom from Distractibility	.44*	.26	.29
Processing Speed	.70**	.48	.54*

Note. n = 39 except for Processing Speed where n = 11.

*p < .05. **p < .01. ***p < .001.

Table 3.

Intercorrelations among WISC-III and K-BIT subtests

	K-BIT	
	Vocabulary	Matrices
WISC-III Verbal Scale		
Information	.56***	.70***
Similarities	.42**	.48**
Arithmetic	.17	.34*
Vocabulary	.59***	.59***
Comprehension	.59***	.39*
Digit Span	.44**	.33
WISC-III Performance Scale		
Picture Completion	.50**	.63***
Coding	.19	.31
Picture Arrangement	.00	.22
Block Design	.25	.57***
Object Assembly	.31	.59

Note. n = 39

*p < .05. **p < .01. ***p < .001.